5. COMMUNICATION NETWORKS

EDI documents are transmitted electronically through phone or data lines from one computer to another. If two entities are to successfully exchange electronic documents with each other, they must conform to a mutually acceptable set of communication conventions. In this section we will discuss the communications options available. A discussion of those options is presented below, along with relative advantages and disadvantages for each one.

5.1. COMMUNICATION NETWORK ALTERNATIVES

There are five options available for transmitting EDI documents:

- **Direct Connect:** Organizations may communicate EDI messages by providing direct connects to their systems for their trading partners. In this case, a trading partner would dial directly into an organization's EDI gateway and transmit their EDI transaction sets.

  The advantage of this option is that the start up cost is low, provided that existing equipment can be used. However, if more than a few trading partners use direct connects, the cost of additional manpower, equipment, and technical expertise necessary to install, maintain, and support the trading partners would be significant.

- **Value Added Networks (VANs)**: A third party network, also known as a value added network or VAN, serves as an intermediary between trading partners. A VAN is an electronic service provider that receives, stores, and transmits EDI and other electronic messages for trading partners. VANs support multiple types of communications hardware and software configurations, thereby reducing an organization's burden to establish individual computer connections with each of its trading partners.

  There are many advantages to using a VAN. First, an organization will only have to implement one connection to the VAN through which all messages will be sent and received. Second, VANs are considered to be extremely reliable and secure for EDI transmissions, and are readily available through several large firms on a 24-hour basis. These firms offer a variety of protocols and speeds for connecting to their networks, and provide procedures and personnel to handle routine maintenance, problems, and user support.

  The disadvantage of using a VAN is that even though the cost is relatively low, small trading partners may still find it to be financially burdensome.

- **Value Added Services (VASs):** A VAS is similar to a VAN, except that a VAS provides additional services, such as consulting and training. VASs vary widely both in terms of the services they provide and their fee structures.

  VASs offer all the advantages of VANs, as described above. Furthermore, the consulting and training offered by VASs enable smaller organizations to implement EDI in a more timely manner. However, it should be noted that the cost of using a VAS is higher than that of a

VAN. While all organizations may not need the level of assistance and service provided by a VAS, they would be required to pay for it regardless.

- **The Federal Acquisition Computer Network (FACNET):** FACNET is a communications network that is designed to allow Federal agencies to inform the public about federal contracting opportunities, permit electronic submission of bids and proposals, and facilitate responses to questions regarding solicitations. FACNET is accessible to registered vendors via a personal computer (PC) and modem. FACNET consists of two subcomponents - Network Entry Points (NEPs) through which Federal agencies would transmit their documents, and third party communication networks (VANs and VASs) from whom vendors would retrieve these documents.

  The advantage of using FACNET is that Federal agencies are currently being charged $1,500 each month for communicating through FACNET, regardless of their volume of transactions. This makes FACNET a relatively inexpensive method of communication, especially as an agency's transaction volume increases. In addition, a Central Contractor Registration (CCR) database has been established to maintain information on registered government vendors. There are currently over 2,500 vendors listed in the CCR database, and the user will have the ability to broadcast RFQs to, and obtain competitive price quotes from, this vendor base.

  The disadvantage of using FACNET is that it is designed for acquisition-related messages and may not be suitable for other types of EDI transmissions. Also, recent issues have been raised as to the reliability of transmissions through FACNET. FACNET users have found that the NEPs are often not accessible and that messages are sometimes misdirected or dropped. In addition, users have to contact the NEP, which in turn contacts the VAN, thus adding an extra layer of support requirements and time to solve problems. Finally, it should be noted that FACNET may not be cost effective for agencies with low volumes of transactions, and that some of the networks participating in FACNET levy higher fees on government trading partners utilizing their services than their private sector customers.

- **Internet:** The Internet is an open, global network with over 70,000 participating networks that transfer messages to each other. The Internet supports a wide range of applications such as electronic mail, bulletin boards, file transfer, database searches, and the World Wide Web. The individual networks are owned and managed by educational and commercial institutions for the most part, but there is no supervision of the Internet as a whole.

  The advantages of using the Internet are that the cost of transmitting messages over the Internet is relatively low, and that the Internet has a wide outreach as there are currently over 2 million Internet users in North America. In addition, there are many third party service providers (e.g., Compuserve, America Online) who enable users to connect to the Internet. These services can be accessed through a variety of protocols and typically require only a simple communications software package.

  The disadvantages of using the Internet are that it does not use ANSI X12 message and envelope standards, and therefore, only a few organizations use it for transmitting EDI

messages. The Internet does not enforce any uniform standard of security across participating networks, and data that is transmitted over the Internet can be accessed by unauthorized parties. Special security measures, such as firewalls and encryption, are needed for transmitting EDI messages over the Internet. Moreover, as there is no single entity that manages and operates the Internet, the reliability of transmissions tends to be low, and there is no accountability for dropped or misdirected messages.

5.2. EVALUATING AND SELECTING A COMMUNICATION NETWORK

The following four-step approach is recommended for evaluating and selecting a communications network to transmit EDI documents:

1. **Identify Communications Network Requirements and Evaluation Criteria:** The first step in selecting a communications network is to determine the functional and technical requirements that the network will need to meet. Once the requirements have been determined, the organization can compare networks against them and determine the best alternative.

   A list of key features that are typically sought in a communication network is presented in Section 5.3, Features of Communications Networks. This list should be tailored to suit the EDI application being implemented.

2. **Select Network Option:** The next step in selecting a communication network is to identify and analyze the different network options that are available. The preceding section provided some information on the major network options that are available to organizations implementing EDI. These options should be compared to the functional and technical requirements of the EDI application and the organization should select the most suitable alternative.

3. **Develop List of Network Service Providers:** Once the network option has been decided upon, the agency should identify the sources from which network services may be obtained. Popular EDI magazines, such as EDI World, periodically publish lists of VANs.

4. **Compare Network Service Providers and Make Final Selection:** The user should then undertake a more detailed evaluation of the network service providers based on the requirements determined in Step 1. The service providers should be contacted to obtain literature and other relevant materials. The results of this analysis should be documented in a table such as the one presented in Exhibit 5-1, Sample EDI Network Evaluation Matrix. The network service that best meets the organization's requirements should be selected for the EDI implementation. The service provider should then be contacted and appropriate arrangements should be made to subscribe to the service. Most network service providers will have a sign-up form that will have to be completed. In addition, the user should ensure that a data confidentiality agreement is executed with the network service provider.

Vendor Name	Vendor 1	Vendor 2	Vendor 3	Vendor 4
Network Name	**Network 1**	**Network 2**	**Network 3**	**Network 4**
EDI Standards Supported - ANSI ASC X12 - EDIFACT				
Communications Protocols Supported - Asynch (9600 - 28,800 bps) - Bisynch				
Accessibility - Local number - Toll-free number				
Availability				
Reliability				
Security - User IDs and passwords - TP authorization - Encryption standards supported - B2 security supported				
Data Confidentiality				
Network Used by Trading Partners				
Network Use for Similar Applications				
Connections to Other Networks				
Backup and Recovery				
Reports - Message Transmission Log - Message Receipt Log - Authorized Trading Partner List				
Translation Services				
EDI-to-Fax Service				
Network Users				
Vendor Services - Help Desk Hours - Toll-free number access				
Price - Set-up fees - Mailbox fees - Interchange transmission charge - Character transmission charge - Translation service charge - EDI-to-fax charge - Vendor support includes				

Vendor Name	Vendor 1	Vendor 2	Vendor 3	Vendor 4
Network Name	Network 1	Network 2	Network 3	Network 4
Available through Federal Contract				

Exhibit 5-1: Sample EDI Network Evaluation Matrix

5.3. FEATURES OF COMMUNICATION NETWORKS

Presented below are key features that need to be considered when comparing and evaluating communications networks.

1. **EDI Standards Supported:** The communications network should have the ability to support the EDI standards (e.g., ANSI ASC X12, EDIFACT) selected for the application. This will enable the user to address and transmit messages from within the translation software package.

2. **Communications Protocols Supported:** The communications network should have the ability to support, at a minimum, the following communications protocols:

   - ➢ Asynchronous (1200 to 28800 bps)
   - ➢ Bisynchronous (2400 to 9600 bps)
   - ➢ Synchronous (9.6 to 56 kb)

3. **Accessibility:** The communications network should be accessible through a local phone number or a toll-free number. This will eliminate agencies and their trading partners having to pay an additional long-distance charge for using the network.

4. **Availability and Reliability:** The communications network should be available 24 hours a day, 7 days a week for sending and receiving EDI messages. The service provider should provide information on scheduled downtime, as well as the amount of unscheduled downtime for the past year. The communications network should also be reasonably reliable, in that messages should reach the recipient intact, within a period of time acceptable to the user. The user should be able to trace messages as they travel over the network and obtain confirmation of receipt if desired.

5. **Security:** The communications network should provide security features that meet the needs of the EDI application being implemented. At a minimum, access to the network should be restricted to authorized users through the use of identification numbers and passwords. The communications network should also allow the agency to specify who it may exchange messages with to avoid "electronic junk mail". If the EDI application being implemented has a higher level of security requirements, the agency should define such requirements clearly and ensure that the network can meet them.

6. **Data Confidentiality:** If the data contained in the EDI messages being exchanged is subject to the Freedom of Information Act or the Privacy Act, the agency should ensure that the communications network is capable of protecting the confidentiality of the data. This is also a very important consideration for EDI applications that involve the transfer of money.

7. **Connections to Other Networks**: The communications network should have the ability to connect with other networks, so that messages can be sent to and received from trading partners who already subscribe to other networks.

8. **Networks Used By Trading Partners or for Similar Applications:** If a large number of the agency's trading partners use a particular communications network, the user should consider selecting the same network, thus saving it the effort and cost of establishing connections between networks. The agency should also poll other organizations with similar EDI applications to determine whether a particular communications network is mandated or considered highly suitable for that application.

9. **Backup and Recovery:** The communications network should provide adequate backup and recovery of EDI messages while they are in transit over the network or being stored for subsequent retrieval by trading partners. These features indicate the extent to which the network is fault tolerant, the amount of downtime it has, and whether it has sound backup and recovery procedures in place to deal with unexpected problems.

10. **Reports:** The communications network should provide users with reports and logs to assist them in resolving problems, tracing EDI messages, and tracking costs. These

reports and logs should be easily accessible in electronic or hardcopy format, upon demand by the user.

11. **Translation Services:** The communications network should provide translation services to allow smaller organizations to implement the EDI application without having to acquire their own EDI translation software packages. The communications network would convert EDI messages destined for a small organization into a flat file that the organization could download. Conversely, the communications network would receive and convert a flat file from a small organization into EDI messages to be sent to its trading partners.

12. **EDI to Fax Services:** The communications network should allow the user to transmit messages to a trading partner's fax machine upon demand. This is a particularly important feature if many of the trading partners are smaller organizations that are not EDI-capable.

13. **Number of Communications Network Users:** The number of communications network users is the number of users or mailboxes that are currently using the network. The user should select a communications network with a large number of users, as this provides an indication of the reliability and robustness of the network.

14. **Vendor Support Services:** The communications network service provider should maintain a help desk that has trained personnel who can assist in solving network related problems. The help desk should be accessible by telephone 24 hours a day, 7 days a week. The vendor should provide information n help desk call volumes, and the amount of time it takes to respond to calls and to resolve problems.

15. **Cost:** There are fees and charges associated with EDI network services that vary among service providers. Presented below are some of the common fees and charges associated with VANs and VASs:

    - ➢ Set up fees (or one-time fees)
    - ➢ Mailbox charges
    - ➢ Interchange or message transmission fee
    - ➢ Transmission cost

- ➢ Translation service charge
- ➢ EDI-to-Fax Charge

The above list is not exhaustive, and network service providers should be contacted directly to obtain a complete and current price list.

16. Availability Through a Government Contract: The agency should check previously executed government contracts, such as FTS2000, to determine if it is possible to obtain EDI network services through them at a reasonable cost. This will save the agency the effort of negotiating and executing their own network contract.

The agency should examine each of the features described above, and determine which ones are required for their particular EDI application. They should also classify the selected features as mandatory or desirable. Communications networks that do not have one or more of the mandatory features may then be eliminated from any further analysis, and the remaining networks can be compared on the availability of desirable features.